CLAIMS

We claim:

1. A quartz arc tube for a metal halide lamp comprising:

a quartz body enclosing a discharge chamber having a metal halide fill, the discharge chamber having substantially the shape of a right circular cylinder and containing opposing electrodes; the discharge chamber having a nearly symmetric longitudinal surface temperature profile when operating in a steady-state thermal condition wherein the difference between the maximum and minimum temperatures of the profile is less than about 30°C and the maximum temperature of the profile is less than about 900°C.

2. The arc tube of claim 1 wherein the difference between the maximum and minimum temperatures of the profile is less than about 20°C.

3. The arc tube of claim 1 wherein the arc tube is operated in a vertical orientation.

4. The arc tube of claim 1 wherein the arc tube is operated in a non-vertical orientation using an acoustically-modulated power source.

5. The arc tube of claim 1 wherein the arc tube is operated at an average wall loading of from about 25 to about 40 W/cm^2.

6. The arc tube of claim 1 wherein the arc tube when operating exhibits a CRI of greater than about 80.

7. A quartz arc tube for a metal halide lamp comprising:

a quartz body enclosing a discharge chamber having a metal halide fill, the discharge chamber having substantially the shape of a right circular cylinder and containing opposing electrodes, the opposing electrodes being disposed at each end of the discharge chamber and coaxial with the axis of the chamber, the distance between the opposing electrodes defining an arc length;

the inner diameter of the discharge chamber in centimeters being approximately equal to $[(1+P/50)^{1/2}-1]$, where P is the input power in watts; and

wherein the ratio of the arc length to the inner diameter is about one.

8. A method of making a quartz arc tube for a metal halide lamp, the quartz arc tube having a quartz body enclosing a discharge chamber having a metal halide fill, the discharge chamber having substantially the shape of a right circular cylinder and containing opposing electrodes, the opposing electrodes being disposed at each end of the discharge chamber and coaxial with the axis of the chamber, the distance between the opposing electrodes defining an arc length, the discharge chamber having a pierce point where each corresponding electrode enters the discharge chamber, the distance between the pierce point and the corresponding electrode end within the discharge chamber defining an electrode insertion length, the arc tube

when operating in a steady-state thermal condition having a longitudinal surface temperature profile, the method comprising the steps of:

a) selecting an arc length and an inner diameter for the discharge chamber wherein the inner diameter in centimeters is greater than $[(1+P/50)^{1/2}-1]$, where P is the input power in watts, and wherein the ratio of the arc length to the inner diameter is about one;

b) forming the arc tube;

c) operating the arc tube at a predetermined average wall loading to obtain a steady-state thermal condition;

d) measuring a longitudinal surface temperature profile of the discharge chamber to obtain a maximum temperature and minimum temperature;

e) repeating steps b) to d) while incrementally decreasing the inner diameter of the discharge chamber with each iteration until the maximum temperature of the longitudinal surface temperature profile is midway between the ends of the discharge chamber; and

f) repeating steps b) to d) while incrementally varying the electrode insertion length with each iteration until the difference between the minimum temperature and the maximum temperature of the profile is minimized without causing the maximum temperature to exceed about 900°C.

9. The method of claim 8 wherein the arc tube is operated at an average wall loading of from about 25 to about 40 W/cm^2.

10. The method of claim 8 wherein the difference between the maximum and minimum temperatures of the profile is less than about 20°C.